The *National Center* for *Immunization* and *Respiratory Diseases*

2007 ANNUAL REPORT

DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION

From the *Director*

During 2006, CDC's National Immunization Program joined together with components of the National Center for Infectious Diseases to establish the National Center for Immunization and Respiratory Diseases. Working to form a more perfect union while we honor the legacies of the past is our new challenge. We strive to prevent disease, disability and death through immunization and control of respiratory diseases. As the year closes, there is much progress to report.

New Tools: The routine immunization schedule gained three completely new vaccines, following FDA licensure and ACIP votes supporting rotavirus vaccine for infants, human papillomavirus vaccine for adolescent girls, and zoster vaccine for seniors. These innovations hold the promise of reduced hospitalizations, cancer, and chronic pain, but setting policy is only the beginning. We now must support programs, providers and the public to assure these vaccines reach those who need them.

New Tasks: We continued to confront the threat of pandemic influenza as CDC's preparedness efforts escalated further. Our influenza and immunization experts joined the agency's Pandemic Influenza Taskforce and made substantial progress on hundreds of preparedness tasks. Our staff advanced rapid diagnostic test development, exercised organizational preparedness, and convened experts to improve our surveillance strategies. To tackle our growing epidemiology, laboratory and extramural responsibilities, we established a new Influenza Division with Dr. Nancy Cox, 2006 Federal Employee of the Year, at its helm.

Mumps! The outbreak of 2006 was a reminder against complacency. The outbreak began on college campuses in the nation's heartland, prompting our surveillance, epidemic investigations, and laboratory staff to assist the state and local public health workers on the frontlines. We updated ACIP recommendations, and although more than 6,000 cases were reported, we took some comfort knowing that without our strong childhood immunization program, the problem might have been much worse.

Milestones: For the first time ever, we found no significant racial disparity in vaccine coverage in 19–35 month olds with the 4:3:1:3:3:1 series. Maintaining health equity with the newer vaccines will be critical. The nation also logged a record number of influenza vaccine doses distributed. Addressing provider and public expectations given the uncertainties involved in phased vaccine distribution and increasing uptake of the additional doses remain challenges.

Big Science: Reconstruction of the 1918 pandemic influenza virus yielded clues to its remarkable virulence and transmissibility. Dissemination of real-time PCR techniques for polio virus detection sped up acute flaccid paralysis investigations in challenging field settings. Multi-state post-licensure study of pneumococcal conjugate vaccine effectiveness showed the value of a booster and the success of abbreviated regimens applied during vaccine shortages.

Small World: The spread of H5N1 avian influenza led to new partnerships with Ministries of Health and expanded international field assignments to strengthen rapid detection and response capabilities and pandemic planning. Our role in the Global Disease Detection program grew through meningitis, encephalitis, and respiratory syndrome programs in three continents. Our vital partnerships with Rotary International, the American Red Cross, UN Foundation, and many others advanced polio eradication and reduced measles mortality. Our technical assistance and leadership helped accelerate global access to new or underutilized vaccines including rotavirus, *Haemophilus influenzae* b, pneumococcal and meningococcal conjugate vaccines.

There is so much more to do in order to achieve the full promise of prevention and control of vaccine-preventable and respiratory infections. It has been thrilling for me to get to know the people and programs within NCIRD and in partner organizations over this past year. You have taught and inspired me. You make an enormous difference in the lives of so many. ***Thank you!***

RADM Anne Schuchat, MD
Assistant Surgeon General, US Public Health Service
National Center for Immunization and Respiratory Diseases
Centers for Disease Control and Prevention

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A set of four *overarching goals*

Over the last two years, CDC reorganized its Centers, Institutes, and Offices (CIOs) to meet 21st century health and safety threats. New agency-wide overarching goals are the focus for CDC and all its centers, including NCIRD.

Healthy People in Every Stage of Life

Infants and Toddlers ages 0–3 years *Start Strong*
Children ages 4–11 years *Grow Safe and Strong*
Adolescents ages 12–19 years *Achieve Healthy Independence*
Adults ages 20–49 years *Live a Healthy, Productive and Satisfying Life*
Older Adults and Seniors ages 50+ years *Live Better Longer*

Healthy People in Healthy Places

Healthy Communities
Healthy Homes
Healthy Schools
Healthy Workplaces
Healthy Healthcare Settings
Healthy Institutions
Healthy Travel and Recreation

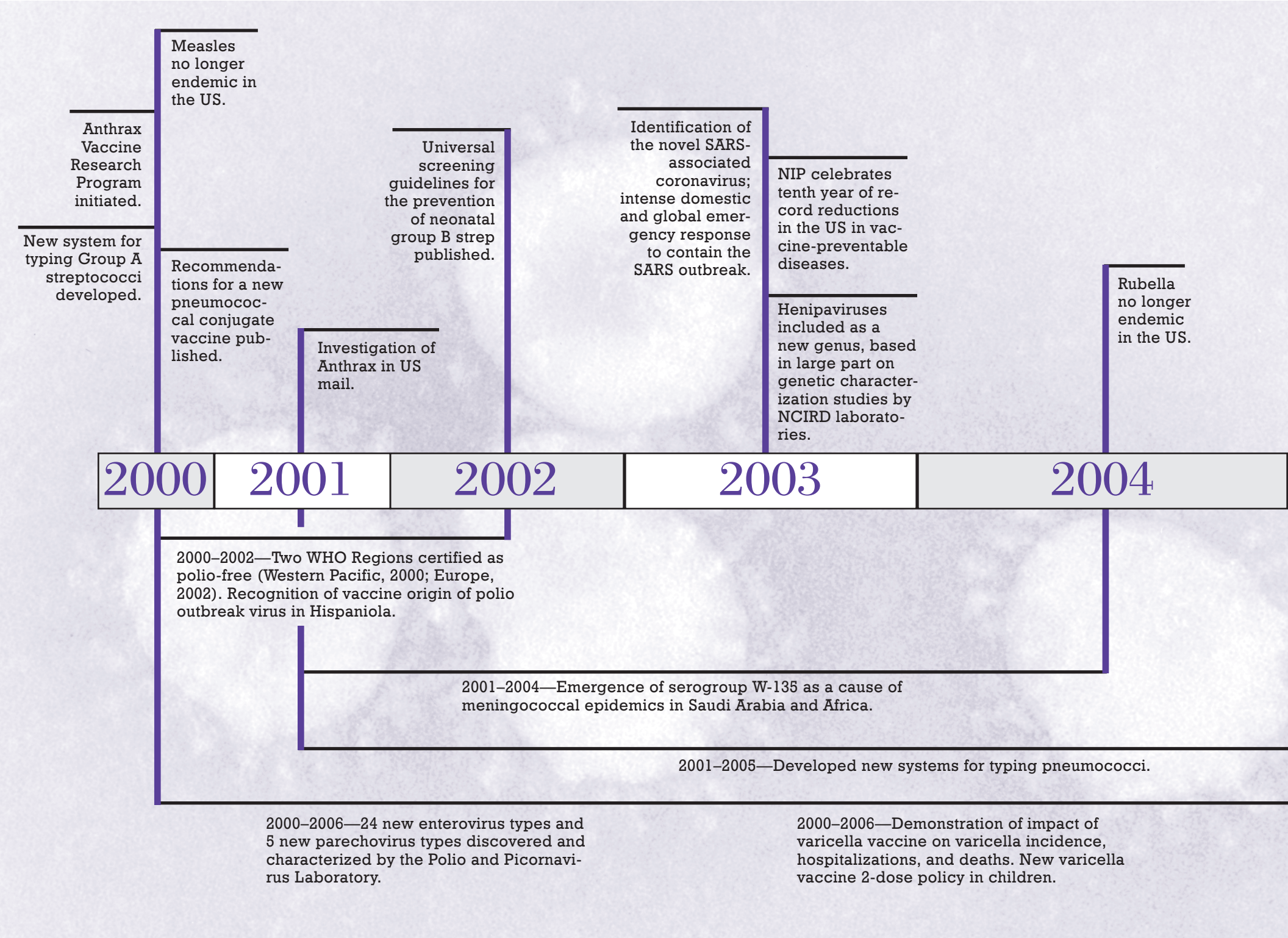
Healthy People in a Healthy World

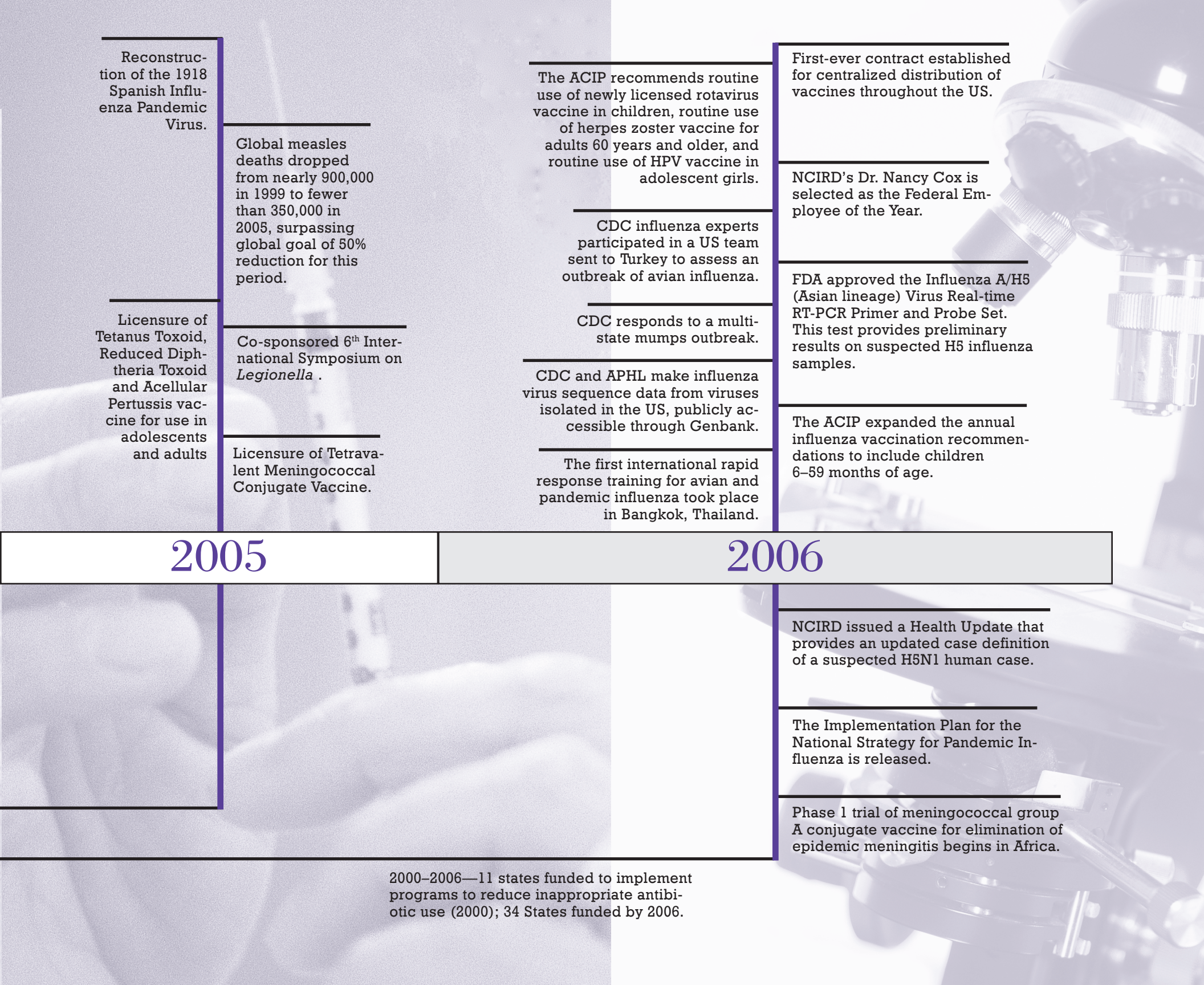
Global Health Promotion
Global Health Protection
Global Health Diplomacy

People Prepared for Emerging Health Threats

Pre-Event
Prevent
Detect and Report
Event
Investigate
Control
Post-Event
Recover
Improve

Timeline activities 2000–2006





Reconstruction of the 1918 Spanish Influenza Pandemic Virus.

Global measles deaths dropped from nearly 900,000 in 1999 to fewer than 350,000 in 2005, surpassing global goal of 50% reduction for this period.

Licensure of Tetanus Toxoid, Reduced Diphtheria Toxoid and Acellular Pertussis vaccine for use in adolescents and adults

Co-sponsored 6th International Symposium on *Legionella* .

Licensure of Tetravalent Meningococcal Conjugate Vaccine.

The ACIP recommends routine use of newly licensed rotavirus vaccine in children, routine use of herpes zoster vaccine for adults 60 years and older, and routine use of HPV vaccine in adolescent girls.

CDC influenza experts participated in a US team sent to Turkey to assess an outbreak of avian influenza.

CDC responds to a multistate mumps outbreak.

CDC and APHL make influenza virus sequence data from viruses isolated in the US, publicly accessible through Genbank.

The first international rapid response training for avian and pandemic influenza took place in Bangkok, Thailand.

First-ever contract established for centralized distribution of vaccines throughout the US.

NCIRD's Dr. Nancy Cox is selected as the Federal Employee of the Year.

FDA approved the Influenza A/H5 (Asian lineage) Virus Real-time RT-PCR Primer and Probe Set. This test provides preliminary results on suspected H5 influenza samples.

The ACIP expanded the annual influenza vaccination recommendations to include children 6–59 months of age.

2005

2006

NCIRD issued a Health Update that provides an updated case definition of a suspected H5N1 human case.

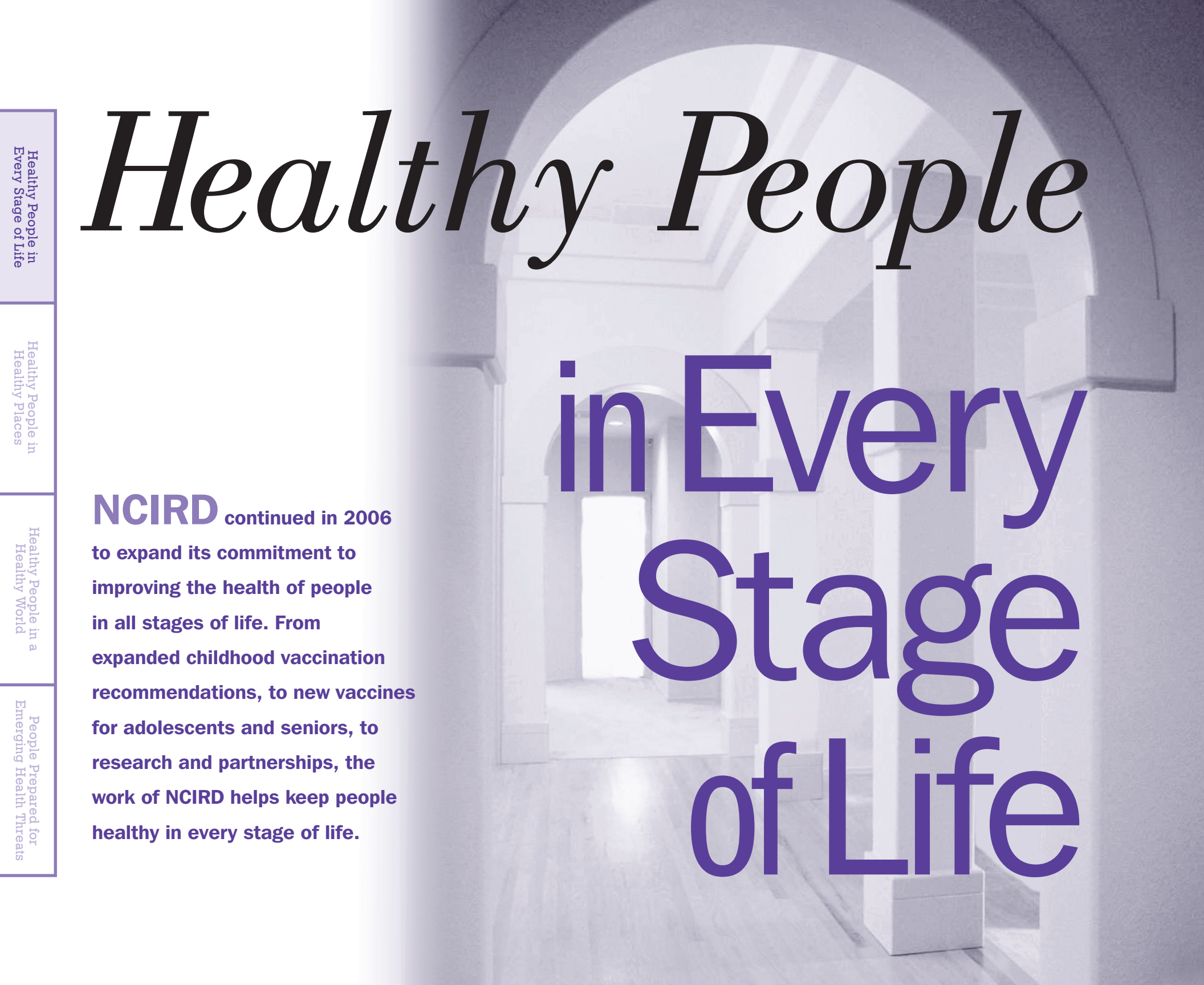
The Implementation Plan for the National Strategy for Pandemic Influenza is released.

Phase 1 trial of meningococcal group A conjugate vaccine for elimination of epidemic meningitis begins in Africa.

2000–2006—11 states funded to implement programs to reduce inappropriate antibiotic use (2000); 34 States funded by 2006.

Healthy People

in Every Stage of Life



NCIRD continued in 2006 to expand its commitment to improving the health of people in all stages of life. From expanded childhood vaccination recommendations, to new vaccines for adolescents and seniors, to research and partnerships, the work of NCIRD helps keep people healthy in every stage of life.

Partnerships the key to success of 2006

National Infant Immunization Week

The annual National Infant Immunization Week (NIIW) was celebrated April 22–29, 2006, marking the third consecutive year that HHS and CDC joined the Pan American Health Organization (PAHO), the US-Mexico Border Health Commission (USMBHC), and 39 nations in the Western Hemisphere to celebrate Vaccination Week in the Americas (VWA), the same week as NIIW. These partnerships highlighted the need for routine vaccinations and the importance of immunizing infants against vaccine-preventable diseases by age 2. Participants in NIIW-VWA included state and local health departments, healthcare providers, and other immunization partners. Public relations materials, planning tools, campaign materials, web banners and buttons, and logos were available from the CDC website.

These partnerships highlighted the need for routine vaccinations and the importance of immunizing infants against vaccine-preventable diseases by age 2

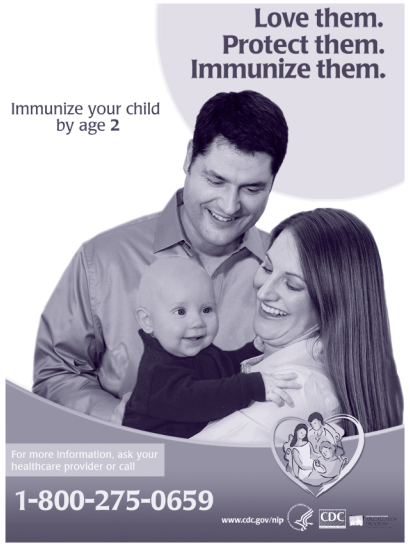
Public health advisors from NCIRD served as external consultants and participated in VWA activities in Haiti and Paraguay, monitoring the vaccination campaigns, participating in cross-border inaugural events, developing surveys, implementing rapid monitoring coverage surveys, and searching for active measles cases. To celebrate NIIW in the US, NCIRD staff traveled to 15 cities in 7 states, including Boise, Idaho; Austin, Texas; and Washington, D.C., to participate in media events and to provide educational presentations at grand rounds, provider education and training conferences, community forums, awards ceremonies, and other events promoting infant immunizations.

FEELING WELCOMED
Dr. Schuchat gets to know participants from the Mountain Park Health Center NIIW celebration in Arizona.

Special NIIW-VWA events took place in two kickoff states, Utah and Arizona

NIIW events in Utah included a proclamation signing with Governor Huntsman, provider education presentations, and "Love Them, Protect Them, Immunize Them" press events in Provo and St. George featuring state and local health departments working together with CDC staff. Utah showcased the new Electronic Immunization Reminder Service, an online service where parents can register to receive e-mail reminders about their children's vaccinations.

NCIRD's director, Anne Schuchat, traveled to Arizona to participate in a 4-day, 3-city NIIW-VWA tour which included a wide variety of activities throughout the state and on the US-Mexico border. Fifteen media and educational activities were organized by a state planning



committee, led by the Arizona Department of Health Services Immunization Program. Activities brought together diverse partners—ranging from school nurses in Tucson, to promotoras (lay health workers) in Yuma and Mexico, to legislators in Phoenix.

In addition to key state events, NCIRD continued to promote its successful National Hispanic public education campaign, "Continuando con la promesa" (Keeping the Promise), which has reached over 90% of the US Hispanic population. Television public service announcements (PSAs) aired on 64 stations in 42 cities and 21 states, including 7 of the top 10 Hispanic markets, creating over 450 million media impressions. The radio PSA aired in 23 markets on 47 radio stations, including 9 of the top 10 Hispanic markets, reaching over 12 million listeners.

Closing racial disparity gaps

in childhood immunization

CHILDHOOD IMMUNIZATION RATES for 2005 (the most recent data) for vaccines routinely recommended for children between 19 and 35 months of age remain at or near record highs. For the first time in the past ten years, rates for the full series of recommended vaccines did not vary significantly by race and ethnicity.

According to CDC's annual National Immunization Survey (NIS), estimated immunization coverage rates for the routine series ranged from 79.5% for children of multiple races, 77.1% for Asian, 76.3% for black, 76% for white, and 75.6% for Hispanic children. The series includes four doses of Diphtheria, Tetanus and Pertussis (DTaP), three doses of polio vaccine, one dose of measles-containing vaccine, three doses of Hib vaccine, three doses of hepatitis B vaccine, and one dose of varicella vaccine. Coverage for the previous series that excluded varicella vaccine was 10% lower for black children in 2002, compared to 3% in 2005.

For the first time in the past ten years, rates for the full series of recommended vaccines did not vary significantly by race and ethnicity

For Hispanic children, coverage for the routine series was 7.5% lower in 2000, compared to 3% in 2005. There are several factors contributing to closing the gap, including the 317 program. The Section 317 grant program works to ensure that children, adolescents, and adults receive appropriate immunizations by partnering with healthcare providers in the public and private sectors. Most children served through Section 317 are underinsured or their parents are working poor who cannot afford the deductibles required to fully vaccinate their children.

In addition to the Vaccines for Children (VFC) program, which provides free vaccines for uninsured and underinsured children. In addition, CDC has worked with its partners to develop and provide educational programs and media campaigns for Spanish-speaking and black parents. Beginning in 1994, CDC has created an annual Spanish-language national public awareness campaign with advertising for radio and television broadcast and newspaper and magazine placement, as well as posters, brochures, and education kits for distribution through health clinics and community-based organizations.

Other significant findings from the 2005 NIS indicate that substantial progress has been made in five years after the introduction of the pneumococcal conjugate vaccine (PCV), despite past shortages of the vaccine. Coverage estimates for 2005 indicate that more than 50% of the nation's children are fully vaccinated with PCV, and more than 80% have received at least three of the four-dose series. Estimates for four doses of PCV most likely remain low because prior shortages affected children included in the 2005 NIS.

Preventing group B streptococcal disease and influenza

protecting the vulnerable

How do you protect the most vulnerable from influenza?

CDC and its advisory committee on vaccination practices currently recommend the influenza vaccine for all pregnant women. NCIRD's Influenza Division is collaborating on a study with the Center for American Indian Health and The Johns Hopkins Bloomberg School of Public Health to investigate whether influenza vaccination of pregnant women can help protect infants from influenza. Limited studies suggest that vaccinating pregnant women could benefit young infants (in addition to protecting the mother), but more research is needed.

The study's results may provide information about whether vaccinating pregnant women against influenza can protect infants younger than six months of age from influenza

The study—titled "Effect of Maternal Influenza Vaccination on Respiratory Disease Among Infants"—evaluates the impact of influenza vaccination during pregnancy on the rates of influenza illness in infants born to vaccinated women, compared to that of infants born to unvaccinated women.

Analysis of the data collected during the study is underway, with results expected in 2007. The analysis will look at the effectiveness of maternal influenza vaccination to protect against culture-confirmed influenza infections in infants.

The study's results may provide information about whether vaccinating pregnant women against influenza can protect infants younger than six months of age (a group that cannot receive influenza vaccine) from influenza.

EDUCATION EFFORTS
group B strep brochures target pregnant women.

Ten years of group B strep policy and research continues to save newborn lives

2006 marks the ten-year anniversary of group B strep screening guidelines. On May 31, 1996, CDC issued recommendations for preventing perinatal group B streptococcal disease, one of the leading infectious causes of infant morbidity and mortality. Since 1996, 47,000 cases of the disease have been prevented in the US, while prenatal screening of pregnant women has become the standard of care in this country, and racial disparities are decreasing. Research continues in NCIRD to further support group B strep prevention efforts.

New vaccine recommendations

protecting babies and kids as they grow

New study supports expanded influenza vaccination recommendations in 2006

After children are born, they continue to be vulnerable to the threat of influenza. NCIRD identified the impact of influenza among children under the age of 5 years in terms of the number of visits to the doctor and trips to the emergency room related to influenza illness each season, using a study conducted by the New Vaccine Surveillance Network (NVSN).

This study was critical in the 2006 ACIP decision to expand annual influenza vaccination recommendations to children 6 to 59 months of age

The results of this study appeared in the *New England Journal of Medicine* on July 6, 2006, in an article entitled "The Underrecognized Burden of Influenza in Young Children." The study examined data during two different influenza seasons and concluded that outpatient visits associated with influenza were common among children younger than five years old. This highlighted the burden that influenza places on the health of children each year in the US, in addition to the impact upon healthcare systems. This study was critical in the 2006 ACIP decision to expand annual influenza vaccination recommendations from children 6 to 23 months of age to children 6 to 59 months of age.

Fighting another common and potentially severe virus—a promising new rotavirus vaccine

Nearly every US child is infected with rotavirus by the age of five years. This infection often results in severe vomiting and diarrhea that sickens almost three million US children each year. Rotavirus is responsible for approximately 400,000 outpatient visits, 200,000 emergency room visits, and 55–70,000 hospitalizations each year. During the winter months, rotavirus is the second most common ailment (after acute respiratory infections) leading to physician visit or hospitalization among US children. Because of the severe vomiting associated with rotavirus disease, administration of fluids by mouth can be difficult, frequently resulting in dehydration, which can have serious consequences.

In February, 2006, a new vaccine was licensed by the US Food and Drug Administration for use among US children and was recommended by ACIP for routine vaccination of all US infants, with three doses given at 2, 4, and 6 months of age. In clinical trials, the vaccine was 74% effective in preventing all rotavirus cases, and more importantly, 98% effective in prevention of severe rotavirus cases. The vaccine has been incorporated into the US childhood immunization schedule. As of October, 2006, approximately 1.8 million doses of rotavirus vaccine have been distributed across the US.

A new vaccine

to prevent infections caused by the human papillomavirus

New first-of-its-kind vaccine to prevent cervical cancer licensed in 2006

Human papillomavirus (or HPV) is a common virus that is spread through genital contact, most often during vaginal and anal sex. While most HPV types cause no symptoms and go away on their own, some types can cause cervical cancer in women. These types also have been linked to other less common genital cancers—including cancers of the anus, vagina, and vulva (area around the opening of the vagina). Other types of HPV can cause genital warts in men and women. At least 50% of sexually active people will get HPV at some time in their lives. Every year in the US, about 6.2 million people get HPV. HPV is most common in young women and men who are in their late teens and early 20s. The American Cancer Society estimated that in 2006, over 9,700 women were diagnosed with cervical cancer and 3,700 women died from this cancer in the US.

By age 50, at least 80% of women will have acquired genital HPV infection

In 2006, the FDA licensed a new vaccine to prevent infections caused by the human papillomavirus

In 2006, the FDA licensed a new vaccine to prevent infections caused by HPV, and the ACIP recommended the vaccine for routine use in adolescents and young women. The HPV vaccine is a quadrivalent vaccine that protects against infection from HPV types 16 and 18 (responsible for 70% of all cervical cancers) and types 6 and 11 (responsible for 90% of genital wart infections).

NCIRD partnerships crucial to bring new vaccine to adolescent girls

The HPV Healthcare Provider Partners' meeting was held in Atlanta, GA, on August 7, 2006. The meeting included over 100 key stakeholders, representing more than 35 national organizations with an interest in incorporating HPV vaccine into the adolescent immunization program. The objectives for this meeting were to inform partners about the new HPV vaccine and the recommendations approved by the ACIP, to provide opportunity for collaboration between CDC and its partner organizations related to the implementation of HPV vaccine, and to identify both barriers to implementation of HPV vaccine, and potential strategies to address those barriers.

In 2006, NCIRD partnered with the Georgia Obstetrical and Gynecological Society to produce a DVD with accompanying resource materials to support the introduction of HPV vaccine. The DVD is designed to educate healthcare professionals who will manage and administer HPV vaccine in Georgia OB-GYN practices.

Will parents actually get their daughters vaccinated against cervical cancer?

In December 2006, NCIRD conducted 18 focus groups in three cities with African- American, Caucasian, and Hispanic female caregivers of 11 and 12 year old girls. The focus groups explored the knowledge and beliefs that mothers/caregivers had about HPV, learned what information is of key importance for acceptance of the vaccine, and pre-tested select health communication materials.

Recognition of the terms "HPV" and "human papillomavirus" were widespread among female caregivers of preteen girls, but knowledge of HPV was generally shallow. When asked what questions they had about the vaccine, mothers were eager to learn about HPV and the vaccine, especially its side effects, effectiveness, and how long the immunity lasted.

While caregivers of pre-teens were motivated by the opportunity to protect their daughters from cancer, they were averse to associating the vaccine with sex, and therefore not motivated by its ability to protect their daughters from genital warts. Interestingly, many caregivers expressed the concern that giving their daughter this vaccine would also be giving her permission to be sexually active; mothers do not want to promote sexual activity, nor do they want to think of their pre-teen as having sex. However, mothers overall were very accepting of this vaccine, and were persuaded by the educational materials and focus group discussion to either talk to their child's healthcare provider about getting the vaccine, or had plans to actually take their child to get it, especially if the vaccine were promoted as part of the general adolescent platform.

Mothers were overall very accepting of this vaccine

Prevention

from cancer to acute meningitis

A new vaccine for adolescents gets tested for effectiveness

Meningococcal disease is an important cause of morbidity and mortality in the US. In 2005, the meningococcal conjugate vaccine was licensed and recommended for persons at increased risk for meningococcal disease, including adolescents and college freshmen living in dormitories.

In 2006, NCIRD began enrolling subjects in two important post-licensure studies of the conjugate vaccine. The first was a case-control study of vaccine effectiveness. This study is being conducted through a large network of state and local public health partners, including Emerging Infections Program (EIP) sites and other health departments participating in "MeningNet." When complete, this study will provide the first estimate of the effectiveness of this vaccine.

The conjugate vaccine is expected to protect against the acquisition of carriage among vaccinated persons, interrupting transmission even to unvaccinated persons

The second study began a field trial of the effect of the vaccine on the acquisition of nasopharyngeal carriage of meningococcal bacteria. Nasopharyngeal carriage of meningococci is a necessary, but not sufficient, cause of invasive meningococcal disease. Carriage is acquired by contact with large respiratory droplets or oral secretions from other carriers of the bacteria. Unlike the polysaccharide meningococcal vaccine, the conjugate vaccine is expected to protect against the acquisition of carriage among vaccinated persons, interrupting transmission even to unvaccinated persons. This study is a collaboration among CDC and the Georgia and Maryland Emerging Infections Program sites. It is being conducted in four high schools in each state and has required a large effort by CDC and EIP personnel in the field to register, throat swab, and vaccinate hundreds of participating students. When complete, this study will provide an estimate of the effect of this vaccine on carriage, informing future vaccination policy.

SAY "AHH!" Dr. Eric Stern swabs a high schooler's throat on Halloween day.

Investigating Guillain-Barré syndrome: a result of meningococcal vaccine?

Soon after the 2005 licensure of the tetravalent meningococcal conjugate vaccine, a number of cases of Guillain-Barré syndrome (GBS) were recognized among recipients of the vaccine.

GBS is a serious disorder in which nerves lose their ability to conduct electrical impulses. Primarily affecting peripheral motor nerves, GBS can cause weakness and loss of motor control. In severe cases, the muscles that control breathing can be affected. Most persons with GBS recover fully, though some have long-term residual weakness. GBS is known to be precipitated by a number of infectious agents, and certain vaccines have previously been associated with an increased risk of GBS.

Through September 2006, 17 cases of GBS occurring in a six-week "risk window" after meningococcal vaccination were reported. Working with the CDC's Immunization Safety Office, NCIRD scientists provided assessments of the risk of GBS associated with the meningococcal vaccine in several *Morbidity and Mortality Weekly Report* updates, as well as to the ACIP. In light of an ongoing risk of meningococcal disease and its associated morbidity and mortality, as compared to a possible brief, small elevation in risk for GBS following immunization, continuation of existing meningococcal vaccine recommendations and further assessment of the magnitude of the risk of GBS were recommended.

The persistent problem of *pertussis*

Pertussis is an acute, infectious cough illness that remains endemic in the US, despite longstanding routine childhood pertussis vaccination. Immunity to pertussis wanes approximately five to ten years after completion of childhood vaccination, leaving adolescents and adults susceptible to pertussis. Since the 1980s, the number of reported pertussis cases has steadily increased, especially among adolescents and adults. Of 25,616 cases reported in 2005, over 60% were among persons 11 to 64 years of age. Adults and adolescents with pertussis may experience a protracted cough illness with complications that can require hospitalization. In addition, adults and adolescents can transmit pertussis to infants, who are more likely to suffer from pertussis and pertussis-related deaths than older age groups.

In 2005 and 2006, NCIRD staff presented new epidemiologic and clinical data, as well as technical information, to formulate new proposed recommendations for the ACIP Pertussis Working Group. ACIP voted to recommend that adolescents and adults 11 to 64 years of age who have not previously received Tdap receive a single dose of Tdap, instead of the next adult Tetanus-Diphtheria (Td) vaccine. ACIP also recommended that adults who are in close contact with an infant <12 months of age, as well as healthcare personnel, should receive a dose of Tdap at an interval as short as two years since the most recent Td.

ACIP voted to recommend that adolescents and adults 11 to 64 years of age who have not previously received Tdap receive a single dose of Tdap vaccine.

Community-based programs help vaccinate hard-to-reach adults

Federal funding through the Section 317 Grant Program and the Vaccines for Children Program helps to support nationwide activities to increase immunization rates among children, adolescents and adults. Public health agencies use these resources for a variety of activities, including vaccine delivery, education and outreach, and training of health care providers. States also use the funding to initiate new ideas and programs to increase immunization rates. For example, the Rhode Island Immunization Program was involved with a church-based event, "Rock the City." During this event, over 3,000 people across the state participated in a block party. The party was located in an urban at-risk community. Local churches provided food, clothing, raffles, gifts, and fun activities. Area physicians donated their time. The immunization program provided free adult vaccinations against Td, pneumonia (ages 65 years and older), and diphtheria. Over 200 adults were vaccinated last year at this single event.

New vaccine for adults

New zoster vaccine recommended for adults 60 years of age and older

Once a child gets over chickenpox, caused by the varicella zoster virus (VZV), the virus becomes "latent"—lying in wait in the nerve cells that come off the spinal cord. While the virus usually remains inactive throughout life, it can "reactivate," travel down the nerve cell, and cause zoster (also known as shingles or herpes zoster)—a rash that is associated with severe pain and discomfort.

About one million persons experience zoster in the US every year

While the pain of zoster can be intense, it generally resolves by the time the rash clears, usually within several weeks. However, a common and feared consequence of zoster is post-herpetic neuralgia (PHN), which is pain that can be excruciating and persists well after the rash clears—sometimes lasting months and even years. This complication can be very debilitating, and in severe cases it can lead to depression and to social isolation. Zoster may also affect the eyes with some frequency, threatening eyesight.

About one million persons experience zoster in the US every year. The risk of zoster increases with age, but the risk

really begins to accelerate after the age of 50. It is thought that this age effect is due to weakening immunity to VZV that is a natural part of aging; immunosuppression is also a strong risk factor for zoster.

Based on these data and on other considerations, the ACIP voted in 2006 to recommend zoster vaccination of persons at least 60 years of age. Soon, zoster vaccine may help reduce the burden of disease among vulnerable elderly populations.

From zoster to flu—designing effective influenza vaccines for older adults

People aged 65 years and older are at highest risk for hospitalizations and deaths from influenza. In fact, more than 90% of the people who die from influenza-related causes each year in the US are 65 years or older. Susceptibility to influenza (and other infectious diseases) among the elderly is due to a decline in immune function and an increased prevalence of chronic health conditions.

In addition to being less able to resist infectious diseases, the elderly are also less responsive to vaccinations. NCIRD's Influenza Division is conducting research into why immune function

People aged 65 years and older are at highest risk for hospitalizations and deaths from influenza

declines with age. Such research will help us develop strategies to overcome this decline by enhancing the body's defense mechanisms to prevent infection and increasing the effectiveness of vaccines in the elderly.

In a pioneering study, NCIRD researchers demonstrated that innate immune defenses erode with time. Currently, NCIRD is investigating novel ways of boosting innate immune function at the time of vaccination to improve the immunogenicity of humans. Additionally, they are working on pre-clinical studies on avian influenza vaccines for the elderly.

The outcome of these studies will help to design improved vaccines to overcome poor immune responses in the elderly. While research continues, NCIRD promoted influenza vaccine—still offering significant protection—among seniors and the elderly during the 2005–2006 and 2006–2007 influenza seasons.